

REMARKS

The Office Action dated July 21, 2005, has been received and carefully noted. The above amendments and the following remarks are submitted as a full and complete response thereto.

By this amendment, claim 1 has been amended for editorial purposes. The amendments to claim 1 do not narrow the scope of the claim. No new matter has been added. Claims 1-6 are pending and respectfully submitted for consideration.

The Applicants wish to thank the Examiner for indicating allowable subject matter in claims 2-6. Claims 2-6 were not rewritten in independent form as they depend from claim 1, which is allowable for the reasons submitted below.

Claim 1 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Sato et al. (U.S. Patent No. 6,155,895, "Sato") in view of Kunze et al. (U.S. Patent No. 6,595,164, "Kunze"), Okada et al. (U.S. Patent No. 5,497,734, "Okada") and Batzill (U.S. Patent Publication No. 2002/0189558).

Sato was cited for disclosing many of the claimed elements of the invention with the exception of a pair of left and right cooling water passages branching from a cooling water passage for supplying cooling water from the cooling water pump to the cylinder block cooling water jacket being made to communicate with the cylinder head cooling water jacket via gasket faces of the cylinder block and the cylinder head. Kunze, Okada and Batzill were cited for curing these deficiencies. The Applicants traverse the rejection and respectfully

submit that claim 1 recites subject matter that is neither disclosed nor suggested by the cited references.

As a result of the claimed invention, the water-cooled vertical engine has an arrangement in which the cylinder block cooling water jacket and the cylinder head cooling water jacket are substantially independent of each other. Owing to this arrangement, it is easy to set the temperature of the cylinder block and the temperature of the cylinder head independently at appropriate temperatures.

Furthermore, in the above-mentioned arrangement, cooling water is supplied to the cylinder head cooling water jacket by a specific arrangement wherein a pair of left and right cooling water passages, branching from a cooling water passage. The cooling water passage supplies cooling water from a cooling water pump to the cylinder block cooling water jacket. The pair of left and right cooling water passages communicate with the cylinder head cooling water jacket via gasket faces of the cylinder block and the cylinder head which are mating faces of the cylinder block and cylinder head. Therefore, the number of components can be reduced and space can be saved advantageously in comparison with a case in which cooling water is supplied to the cylinder head cooling water jacket via an external pipe. Moreover, since the pair of left and right cooling water passages is provided and communicates with the cylinder head cooling water jacket, the flow of cooling water within the cylinder head cooling water jacket can be made uniform and reliable, thereby enhancing the cooling effect.

Sato discloses that cooling water is delivered from an exhaust manifold 111 to a cylinder block and from the cylinder block through a cylinder head gasket 161 to the cylinder head assembly and its cooling jacket. See column 9, lines 62-63 and Fig. 9.

Kunze discloses coolant pump 12 that conveys liquid coolant to cylinder head 10 and cylinder block 11, which enters both cylinder elements in parallel and flows through them longitudinally through coolant conduits. See column 3, lines 7-13.

Okada discloses that an outlet of the water pump 23 is communicated through the bank center of the two banks 21 and 22 with respective inlet ports 27 and 28 of the left and right cylinder block water jackets 25 and 26. The outlet of the water pump 23 is also communicated through the bank center with respective inlet ports 33 and 34 of the left and right cylinder head water jackets 31 and 32. That is, the left water jackets 25 and 31 are arranged in parallel with the right water jackets 26 and 32, with respect to the outlet of the water pump 23. See column 5, lines 1-10.

Batzill discloses that first connecting tubes 36 are connected to cooling jackets 16, 18, which are disposed in the cylinder block and through which the flow runs longitudinally, whereas the second connecting tubes 38 are connected to the external longitudinal coolant channels 40, 41, cast into the upper part 12 of the crankcase. The external longitudinal coolant channels 40, 41 exhibit inlet openings 47, which are assigned to the individual cylinder head units and through which the coolant is passed into the cylinder head cooling spaces 20, 22.

As acknowledged in the Office Action, Sato does not disclose a pair of left and right cooling water passages, branching from a cooling water passage for supplying cooling water from the cooling water pump to the cylinder block cooling water jacket, being made to communicate with the cylinder head cooling water jacket via gasket faces of the cylinder block and the cylinder head. However, in combining Sato and Kunze, the Office Action took the position that Kunze shows a cooling system for an internal combustion engine and that Kunze demonstrates the equivalence of serial and parallel flow between the head jacket and block jacket. See page 2, lines 21-23 of the Office Action. The Applicants respectfully submit, however, that Kunze does not demonstrate the equivalence of serial and parallel flow between the cylinder head 10 and the cylinder block 11. In contrast, Kunze discloses

“[y]et another difference between the embodiments in FIGS. 1 and 2 is that, in the embodiment according to FIG. 2, coolant flows successively through cylinder head 10 and cylinder block 11. Because of this sequential arrangement, the coolant that reaches cylinder block 11 has already been heated in cylinder head 10, thus favoring the intended temperature difference. As seen in FIG. 2, coolant flows transversely to the respective cylinder row through cylinder head 10 and cylinder block 11, as opposed to longitudinally as in FIG. 1.”

See column 4, line 66 to column 5, line 8 of Kunze. As such, the serial flow of coolant in Kunze is not the equivalent of the parallel flow of coolant because the serial flow of coolant results in an increased temperature of the coolant when it reaches the cylinder block 11. See column 5, lines 2-4 of Kunze. Such an increase in temperature is not disclosed in FIG. 1 of Kunze as the coolants are flowing separately through the cylinder head and the cylinder block. As such, it

would not have been obvious to modify the serial flow coolant in Sato because the resulting coolant temperature from the parallel flow would not favor “the intended temperature difference” sought by Sato. Therefore, the Applicants submit that modifying Sato to have a parallel flow, as taught by Kunze and suggested by the Office Action, would change the principle of operation of Sato. If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. In re Ratti, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). As such, the Applicants respectfully submit that modifying Sato with Kunze, as suggested by the Office Action, would change the principle of operation of Sato as follows. Kunze discloses water flowing from the cylinder head to the cylinder block. Sato discloses coolant flowing from the cylinder block 32 and cylinder head assembly 39. Thus, the arrangement of coolant flow in Kunze is opposite to the arrangement of coolant flow in Sato. Therefore, it would not have been obvious to one of ordinary skill in the art to modify Sato with Kunze. Accordingly Sato and Kunze are not properly combinable, as suggested in the Office Action.

The Applicants respectfully submit that Okada fails to cure the deficiencies in the combination of Sato and Kunze. The Office Action cited Okada for teaching a modification to Sato by using parallel flow instead of serial flow between the head and block jackets by providing a separate passage for supplying coolant to the head jacket. However, as discussed above, it would not have been obvious to modify Sato by using parallel flow instead of serial flow

because Okada, like Kunze, does not disclose that parallel flow and serial flow are equivalent.

The Office Action acknowledged that neither Sato nor Okada discloses a pair of left and right cooling water passages made to communicate with the cylinder head cooling water jacket via gasket faces of the cylinder block and the cylinder head. Batzill was cited for curing this deficiency. The Office Action took the position that Batzill could be combined with Sato and Okada because coolant is provided in parallel to the block jacket and head jacket. The Office Action also took the position that “numerous branching passages 47 are shown in Batzill to provide coolant from the supply passage to the head jacket along the length of the head jacket”, and that the branching passages 47 are comparable to the claimed pair of left and right cooling water passages. See paragraph 4 of the Office Action.

In contrast, Batzill discloses inlet openings 47 to guide coolant from the water pump 26 to cylinder head cooling spaces 20, 22 through external coolant channels 40, 41. The inlet openings 47 are not provided on gasket faces between cylinder head housing 14 and the cylinder block, nor do the inlet openings 47 serve as communication passages connecting between the cylinder head cooling spaces 20, 22 and cylinder (block side) cooling jackets 16, 18. In this regard, the Applicants respectfully submit that slotted openings 24 are arranged on the face side of the cylinder cooling jackets 16, 18, are sealed with the aid of a cylinder head seal (not illustrated). See Fig. 6 of Batzill.

As such, none of Kunze, Okada and Batzill cure the deficiencies in Sato with respect to claim 1, as none of the cited references disclose or suggest at least the feature of a pair of left and right cooling water passages, branching from a cooling water passage for supplying cooling water from the cooling water pump to the cylinder block cooling water jacket, being made to communicate with the cylinder head cooling water jacket via gasket faces of the cylinder block and the cylinder head. As none of the references disclose or suggest this combination of features, the references, either singly or in combination, do not support a *prima facie* case of obviousness for purposes of a rejection of claim 1 under 35 U.S.C. § 103.

Under U.S. patent practice, the PTO has the burden under §103 to establish a *prima facie* case of obviousness. In re Fine, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Both the case law of the Federal Circuit and the PTO itself have made clear that where a modification must be made to the prior art to reject or invalidate a claim under §103, there must be a showing of proper motivation to do so. The mere fact that a prior art reference could arguably be modified to meet the claim is insufficient to establish obviousness. The PTO can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. Id. In order to establish obviousness, there must be a suggestion or motivation in the reference to do so. See also In re Gordon, 221 USPQ 1125, 1127 (Fed. Cir. 1984) (prior art could not be turned upside down without motivation to do so); In re Rouffet,

149 F.3d 1350 (Fed. Cir. 1998); In re Dembiczak, 175 F.3d 994 (Fed. Cir. 1999); In re Lee, 277 F.3d 1338 (Fed. Cir. 2002). The Office Action restates the advantages of the present invention to justify the combination of references. There is, however, nothing in the applied references to evidence the desirability of these advantages in the disclosed structure.

In view of the above, the Applicants respectfully submit that the Office Action has failed to establish a *prima facie* case of obviousness for purposes of a rejection of claim 1 under 35 U.S.C. §103.

For at least the combination of foregoing reasons the Applicants respectfully submit that the cited prior art, either singly or in combination, fails to disclose or suggest the present invention as claimed in claim 1.

Claims 2-6 depend from claim 1. The Applicants respectfully submit that these dependent claims are allowable at least because of their dependency from allowable base claim 1. Accordingly, the Applicants respectfully request allowance of claims 1-6 and the prompt issuance of a Notice of Allowability.

Should the Examiner believe anything further is desirable in order to place this application in better condition for allowance, the Examiner is requested to contact the undersigned at the telephone number listed below.

In the event this paper is not considered to be timely filed, the Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension, together with any additional fees that may be due with respect to this

paper, may be charged to counsel's Deposit Account No. 01-2300, referencing
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Respectfully submitted,



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Enclosure: Notice of Appeal and Petition for Extension of Time (three-months)